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305303

December 2019

B. TECH. ECE/EIC 3rd SEMESTER (UNDER CBS)
Network Theory (EC304)

Time : 3 Hours]   [Max. Marks : 75

Instructions :

1. *It is compulsory to answer the questions of Part-1. Limit your answers within 30-50 word in this part.*

2. *Answer any four questions from Part-2 in detail.*

3. *Different parts of the same question are to be attempted adjacent to each other.*

PART - 1

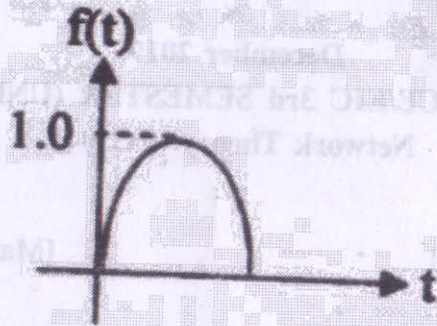1. (a) What do you mean by mesh analysis? Write its basic steps.   (1.5)

    (b) Draw the Norton's equivalent circuit.   (1.5)

    (c) Define power factor.   (1.5)

    (d) Define time constant in series RLC circuit.   (1.5)

(e) Determine the Laplace transform of the waveform

(1.5)

(f) What are the different types of singularity function? (1.5)

(g) Write short note on Fourier transformation. (1.5)

(h) State the necessary conditions for transfer functions and driving point functions. (1.5)

(i) Explain the parallel connection of two-port networks with neat diagram. (1.5)

(j) Explain the following terms :

    (i) Bandwidth.
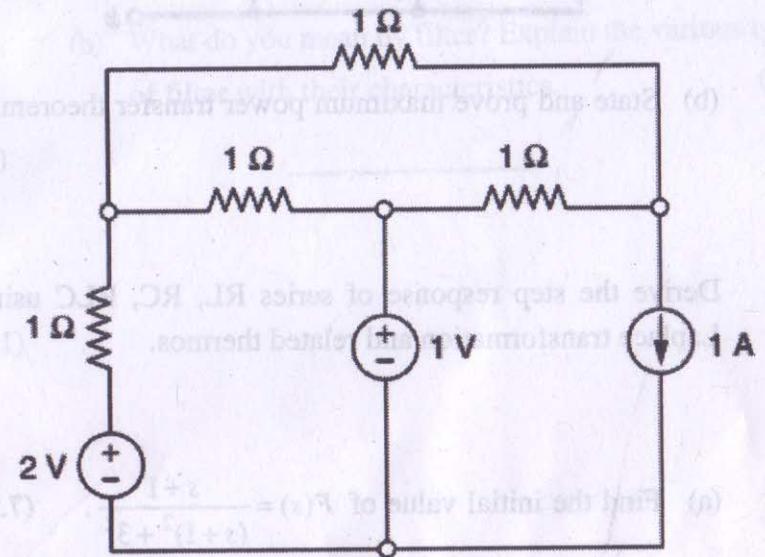
    (ii) Q-factor.

    (iii) Selectivity. (1.5)

PART -2

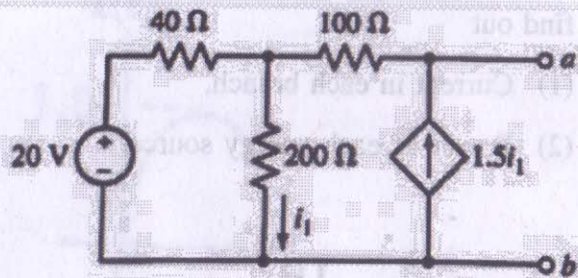2. (a) For the given circuit using Nodal voltage analysis, find out

    (1) Current in each branch.

    (2) Power of each energy source. (10)

(b) Discuss and explain source transformation and duality. (5)

3. (a) Find the Thevenin equivalent of the network shown in figure. What power would be delivered to a load of 100 ohms at a and b? (10)

(b) State and prove maximum power transfer theorem. (5)

4. Derive the step response of series RL, RC, RLC using Laplace transformation and related thermos. (15)

5. (a) Find the initial value of $F(s) = \dfrac{s+1}{(s+1)^2 + 3^2}$. (7.5)

(b) Find the final value of $X(s) = \dfrac{10}{(s+1)^2 + 10^2}$. (7.5)

6. (a) Derive transient current and voltage responses of sinusoidal driven RL and RC circuits. (7.5)

(b) A transfer function is given by

$$Z(s) = \frac{2(s+2)(s+4)}{(s+3)(s+5)(s+7)}.$$

Find its poles and zeros plot.

What is the significance of pole and zeros? Write down the various restrictions on their location. (7.5)

7. (a) Derive and explain convolution theorem in brief. (7.5)

(b) What do you mean by filter? Explain the various types of filter with their characteristics. (7.5)

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